

Attorney Docket No. 025572-0102 (f/k/a 082259-0156)

### REMARKS

The Applicant respectfully requests entry of the foregoing amendments and reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Because this response is being submitted within two (2) months of the mailing date of the Office Action, a prompt Advisory Action is requested in the event that this reply is not found to place the present application in condition for allowance.

Claims 47, 55, 63, and 69 are currently being amended. No new matter is added.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate status identifier for each.

Claims 23-30 and 47-78 remain pending in this application.

### Drawings

In section 1 of the Office Action, the drawings are objected to as failing to comply with 37 CFR § 1.84(p)(4) because reference characters 720 and 710 have both been used to designate the same element in Figure 8. Further, the Office Action indicated that numerical references 730 and 710 designate the same part in Figure 8. The Applicant is unable to understand the Examiner's statement that the Applicant's previous argument "only proves that the drawings need to be amended so that the same element does not represent different elements as intended." The Applicant respectfully disagrees with the objection and therefore do not believe that they are required to provide corrected drawings with corrections to satisfy the objections.

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The Applicant respectfully submits that the drawings appear to be clear with regard to reference characters 720 and 710 which are clearly described in the specification and clearly shown in the drawings as separate elements called out by separate references characters 710 and 720. The Applicant refers the Examiner to the second paragraph starting on page 10 of the original specification. What is disclosed is a "substrate 705 (e.g., silicon, Gallium Arsenide, etc.) may be overlaid with second material 710 (e.g., doped silicon, doped Gallium Arsenide, other non-doped materials, etc.) forming a plurality of gates patterned in second material 710. Further, the device may include a plurality of laser light sources 720 having a first layer 730 (e.g., semiconductor) overlaid with a second layer 740 (e.g., semiconductor) and having a doped junction 750 therebetween." Accordingly, the arrow tipped lead line associated with 720 is pointing to a laser light source which comprises three layers 730, 740, and 750, whereas reference numeral 710 is indicating a gate structure separate from light source 720 in the device shown in Fig. 8. Reference 720 is pointing to a laser light source located between the two gate structures 710 shown in Fig. 8. The Applicant also refers the Examiner to 37 CFR § 1.84(r)(1) in which it is indicated that arrows may be used at the ends of lines providing their meaning is clear to indicate the entire section towards which points. This is clear by the Applicant's specification in which the arrow tip lead line 720 is pointing to the laser light source as described. Accordingly, the Applicant respectfully requests the withdrawal of the objection to characters 720 and 710 being used to designate the same elements in Fig. 8. It is clear that the elements to which each reference number is directed. Further, the Applicant respectfully submits that the drawing is in compliance with 37 CFR § 1.84(r)(1).

The Examiner also objected to the drawings because reference numerals 730 and 710 were said to designate the same part in Fig. 8. The Applicant respectfully requests that the Examiner withdraw the objection because it is clear from the specification and the drawing, in the second paragraph starting on page 10 of the original specification, that there is a patterned gate structure 710 patterned in a second material and there is a laser light source 720 having a first layer 730 with a second layer 740 sandwiching a doped layer 750. Accordingly, the Applicant does not understand why the Examiner indicates that reference numerals 730 and 710

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designate the same part in Fig. 8. Reference 730 is clearly shown in Fig. 8 as a part of light source 720 and separate from either of the gate structures 710 located on either side of light source 720. Furthermore, the combination of the specification and Fig. 8 make clear that the reference numerals 730 and 710 do not designate the same part. Further, it is made clear by arrow tip lead line 720 that layers 730, 740, and 750 are all a part of the laser light source 720. Accordingly, the Applicant respectfully requests the withdrawal of the drawing objection.

**New Matter Objections – 35 U.S.C. § 132(a)**

In section 2 of the Office Action, the language “the interference region ... is uninterrupted by any other material within the interference region” (as cited in the Office Action with regard to the Applicant’s previous amendments to claims 47, 55, 65, and 69) is objected to under 35 U.S.C. § 132(a) as introducing new matter into the disclosure. In section 3 of the Office Action, the language “the interference region being formed of the second material (or optical transmission material for claim 65) and bounded on its periphery by material other than the second material (or optical transmission material)” (as cited in the Office Action with regard to the Applicant’s previous amendments to claims 47, 55, 65, and 69) is also objected to under 35 U.S.C. § 132(a) as introducing new matter into the disclosure. The Applicant respectfully disagrees with these objections.

Claims 47, 55, and 69 have been amended to recite “wherein the interference region is formed of the second material and bounded on its periphery by material other than the second material, the periphery being a single, outer periphery such that only the interference region is within the periphery.” Claim 65 has been amended to recite “the interference region being formed of the optical transmission material and bounded on its periphery by material other than the optical transmission material, the periphery being a single, outer periphery such that only the interference region is within the periphery.” The Applicant directs the Examiner’s attention to, for example, Fig. 1 which shows an exemplary embodiment of a NOT gate 10. Page 4, lines 13-15 of the original specification state that inverter gate 10 is a material patterned on a substrate” and that “inverter gate 10 includes an interference region 25.” The Applicant further directs the

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Examiner's attention to Fig. 8, which shows an exemplary embodiment of an optical processing device. The Applicant also refers the Examiner to the second paragraph starting on page 10 of the original specification, which discloses that a "substrate 705 (e.g., silicon, Gallium Arsenide, etc.) may be overlaid with second material 710 (e.g., doped silicon, doped Gallium Arsenide, other non-doped materials, etc.) forming a plurality of gates patterned in second material 710" and that "optical processor 700 may include a non-translucent layer 760 overlaying substrate 705 and patterned gate structures 710. Thus, the Applicant's specification discloses that the interference region 25 of gate 10 may be patterned in the layer of second material 710 (i.e. is formed of a single second material 710 and is the only material within a single, outer periphery of second material 710), as shown in Fig. 8, and surrounded by a non-translucent layer 760 (i.e., bounded at a single, outer periphery by material other than the second material 710) as shown in Fig. 8. Accordingly, no new matter has been introduced into the disclosure by the Applicant's amendments to claims 47, 55, 65, and 69, and the Applicant respectfully requests withdrawal of the objections under 35 U.S.C. § 132(a).

Claim Rejections – 35 U.S.C. § 112, ¶ 1

In section 5 of the Office Action, claims 47-78 are rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the written description requirement. The Office Action states that "[t]he reasons for rejection based on the newly added matters are set forth in the paragraph above." As such, the Applicant respectfully submits that the reasons stated above with regard to the objection under 35 U.S.C. § 132(a) are sufficient to overcome the rejection of claims 47-78 under 35 U.S.C. § 112, ¶ 1, and the Applicant respectfully requests withdrawal of this rejection of claims 55-64 under 35 U.S.C. § 112, ¶ 1.

In section 6 of the Office Action, claims 55-64 are further rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the enablement requirement. The Office Action states that "[i]t is not clear how could the interference be caused along the axis." The Applicant respectfully submits that he may act as his own lexicographer (see Manual of Patent Examining Procedure § 2111.01) and that it is sufficiently clear to one of ordinary skill in the art from the language of

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claim 55, the specification (e.g., page 5, line 20 – page 6, line 12 of the original specification), and the drawings (e.g., Figs. 2-5 and 7) how the optical conduit receiving output signals is positioned with respect to a predetermined axis associated with maximum interference of optical signals due to the configuration of the interference region. Accordingly, the Applicant respectfully requests withdrawal of this rejection of claims 55-64 under 35 U.S.C. § 112, ¶ 1.

In section 7 of the Office Action, claims 54, 68, and 77 are rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the enablement requirement. The Office Action states that “the specification and claims fail to teach how could the optical logic circuit provides both the NOT and NOT AND logical functions, as recited in claims 54, 68, and 77,” and that “page 6 of the specification only discloses that the NOT AND (NAND) gate is used to construct a NOT gate.” The Applicant respectfully disagrees because the Applicant is reciting structure of the logic circuit rather than the associated function. For example, claim 54 recites that the “optical processor comprises NOT (inverter) gates and NOT AND (NAND) gates,” and does not recite that the NOT (inverter) gates and NOT AND (NAND) gates are used to provide both NOT and NOT AND logical functions. Claim 68 recites that “the Boolean logic function is configured of NOT (inverter) gates and NOT AND (NAND) gates,” and does not recite that the Boolean logic function is configured to provide both NOT and NOT AND logical functions. Claim 77 recites that “the optical processor is configured of NOT (inverter) gates and NOT AND (NAND) gates,” and does not recite that the NOT (inverter) gates and NOT AND (NAND) gates are used to provide both NOT and NOT AND logical functions. The Applicant directs the Examiner’s attention to Fig. 4, which clearly depicts an exemplary embodiment of an AND gate constructed from both a NAND gate and a NOT gate, as well as the related description in lines 11-19 on page 7 of the original specification. Accordingly, the Applicant respectfully requests withdrawal of this rejection of claims 54, 68, and 77 under 35 U.S.C. § 112, ¶ 1.

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**Claim Objections**

In section 8 of the Office Action, claims 47-78 are objected to because of informalities. The Examiner indicated that the "the phrase 'interference region . . . is uninterrupted by any other material within the interference region' recited in amended claims 47, 55, 65, and 69 is confusing and indefinite for it is not clear what does this phrase mean?" and that "[s]ince on one hand, the interference region is defined by the many boundary materials and on the other hand the interference region is a region to light wave front intercept and interfere and it will never be interrupted or else the interference will never occur." The Applicant respectfully submits that claims 47, 55, 65, and 69 have been amended to recite that the interference region is formed of second material and bounded on its periphery by material other than second material, the periphery being a single, outer periphery such that only the interference region is within the interference region. The interference region has only an exterior periphery of another material and does not have an interior region that includes a periphery of another material within. This structure is shown in the Applicant's specification and drawings as stated above with regard to the new matter objections under 35 U.S.C. § 132(a). Accordingly, the Applicant respectfully requests withdrawal of the objections to claims 47-78.

**Claim Rejections – 35 U.S.C. § 103(a)**

a. **Rejection of claims 47-58 and 63-78 based on Usagawa et al.**

In section 10 of the Office Action, claims 47-58 and 63-78 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Usagawa et al. (U.S. Patent No. 5,233,205).

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**i. Claims 47-54**

The Applicant respectfully submits that Usagawa et al. fails to teach, disclose, or suggest all of the elements of claim 47 as combined therein. More specifically, claim 47 has been amended to recite "the interference region comprises the second material and is bounded on its periphery by material other than the second material, the periphery being a single, outer periphery such that only the interference region is within the periphery." The Applicant respectfully submits that support for this feature is found in the Applicant's specification as stated above, and that no new matter has been added. Usagawa et al. does not teach, disclose, or suggest "the interference region comprises the second material and is bounded on its periphery by material other than the second material, the periphery being a single, outer periphery such that only the interference region is within the periphery" as included in the combination of elements of claim 47. The Applicant respectfully submits that the subject matter of claim 47 differs from the structure of Usagawa et al. in that the recited interference region has only a single, outer periphery and does not include boundaries within the periphery. That is, the interference region has only an exterior periphery of another material and does not have an interior periphery of another material as disclosed by Usagawa et al. For example, Figure 1D shows a barrier 2 of another material within the outer periphery of interference region 1 which may be seen as an interior periphery formed by the material of barrier 2 (i.e., another material exists within the). Thus, Usagawa et al. fails to teach, disclose, or suggest "the interference region comprises the second material and is bounded on its periphery by material other than the second material, the periphery being a single, outer periphery such that only the interference region is within the periphery" as included in the combination of elements of claim 47.

The Applicant also respectfully submits that the interference region of Figure 1E of Usagawa et al. is not combined with a "constant coherent light input from a light source" as recited in the combination of elements of claim 47. In response to the Applicant's arguments filed July 5, 2005, the Office Action states that "the instant application also fails to disclose the light source is constant in value for different logic gate functions. The Applicant respectfully

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disagrees. The Applicant refers the Examiner to, for example, page 4, line 12-page 5, line 20 of the original specification. The Applicant further submits that what is taught by Usagawa et al. is that the output may have potentially three different intensities, a low or off value when X1 and X2 are not on, a medium value when either of X1 or X2 is on, and a high value when both X1 and X2 are on. "Accordingly, the output 20 is not "positioned along a chosen line, of many lines, along which maximum destructive interference occurs" as recited in the combination of elements of claim 1. If it were, there would be only two output intensities, as with the Applicant's disclosed design. Further, the outputs of Figure 1E of Usagawa et al. are not "one of two intensities, either a substantially on or substantially or a substantially off intensity" as recited in claim 47. That is, the outputs of Usagawa et al. in Figure 1E have three different possible values. Accordingly, the sensor 20 must be more complex than the sensors used for the Applicant's invention. Thus, the Applicant respectfully submits that claim 47 is not obvious under Usagawa et al. fails to teach, disclose, or suggest all of the elements of claim 47 as combined therein.

Further, the Office Action indicates some similarities between the quantum wave circuit described by Usagawa et al. and the optical logic circuit recited by the Applicant. The Applicant, however, disagrees with this interpretation. The optical logic circuit is based upon propagation of photons to the material and the destructive interference of wave fronts of photons propagating through the material not through a propagation of electrons and holes through a material. The Office Action also states that the quantum well structures require instant light to excite the electron and hole carriers. However, there are ways in which the electron hole carriers may be induced as opposed to light and the inducement of the electronic hole carriers by light is not described, taught, or suggested by Usagawa et al. Further, although what is described by Usagawa et al. is wave-like behavior of electron waves, light is not propagated through the material causing destructive interference as recited in the claims. Accordingly, the equivalence of an electron wave and a light wave has not been established by Usagawa et al.

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Accordingly, the Applicant respectfully requests that the rejection of claim 47 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 48-54 depend from claim 47 and are thus patentable over Usagawa et al. for at least the same reasons as claim 47. Accordingly, the Applicant further requests that the rejection of claims 48-54 under 35 U.S.C. § 103(a) be withdrawn as well.

**ii. Claims 55-58**

With regard to claim 55, the Applicant respectfully submits that independent claim 55 is allowable for substantially the same reasons as claim 47. Accordingly, the Applicant respectfully requests that the rejection of claim 55 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 56-58 depend from claim 55 and are thus patentable over Usagawa et al. for at least the same reasons as claim 55. Accordingly, the Applicant further requests that the rejection of claims 56-58 under 35 U.S.C. § 103(a) be withdrawn as well.

**iii. Claims 65-68**

With regard to claim 65, the Applicant respectfully submits that claim 65 is allowable for substantially the same reasons as claim 47. Accordingly, the Applicant respectfully requests that the rejection of claim 65 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 66-68 depend from claim 65 and are thus patentable over Usagawa et al. for at least the same reasons as claim 65. Accordingly, the Applicant further requests that the rejection of claims 66-68 under 35 U.S.C. § 103(a) be withdrawn as well.

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iv. **Claims 69-78**

With regard to claim 69, the Applicant respectfully submits that claim 69 is allowable for substantially the same reasons as claim 47. Accordingly, the Applicant respectfully requests that the rejection of claim 69 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 70-78 depend from claim 69 and are thus patentable over Usagawa et al. for at least the same reasons as claim 69. Accordingly, the Applicant further requests that the rejection of claims 70-78 under 35 U.S.C. § 103(a) be withdrawn as well.

b. **Rejection of claims 59-62 based on Usagawa et al. in view of Logan et al.**

In section 11 of the Office Action, claims 59-62 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Usagawa et al. in view of Logan et al. (U.S. Patent No. 3,837,728). The Applicant respectfully submits that the claim rejections to claims 59-62 have been addressed because all of the claims 59-62 depend from independent claim 55 which is allowable. Therefore, claims 59-62 are believed to be allowable for at least the same reasons as claim 55. Accordingly, the Applicant further requests that the rejection of claims 59-62 under 35 U.S.C. § 103(a) be withdrawn as well.

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**Conclusion**

The Applicant believes that the present application is now in condition for allowance.  
Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, the Applicant hereby petitions for such extension under 37 C.F.R. § 1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

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